Packaged BCHP for Campus-Style Heating & Cooling Plants

Fort Bragg, NC - 82nd Airborne Heating Plant

Jim Peedin, Honeywell Federal Team

Introduction

- The Right Solution - Building Cooling, Heating and Power Systems make sense for the environment, fuel efficiency and risk management.
- The Challenge - The required capital investment and optimizing technology.
- A Possible Answer - Packaged BCHP

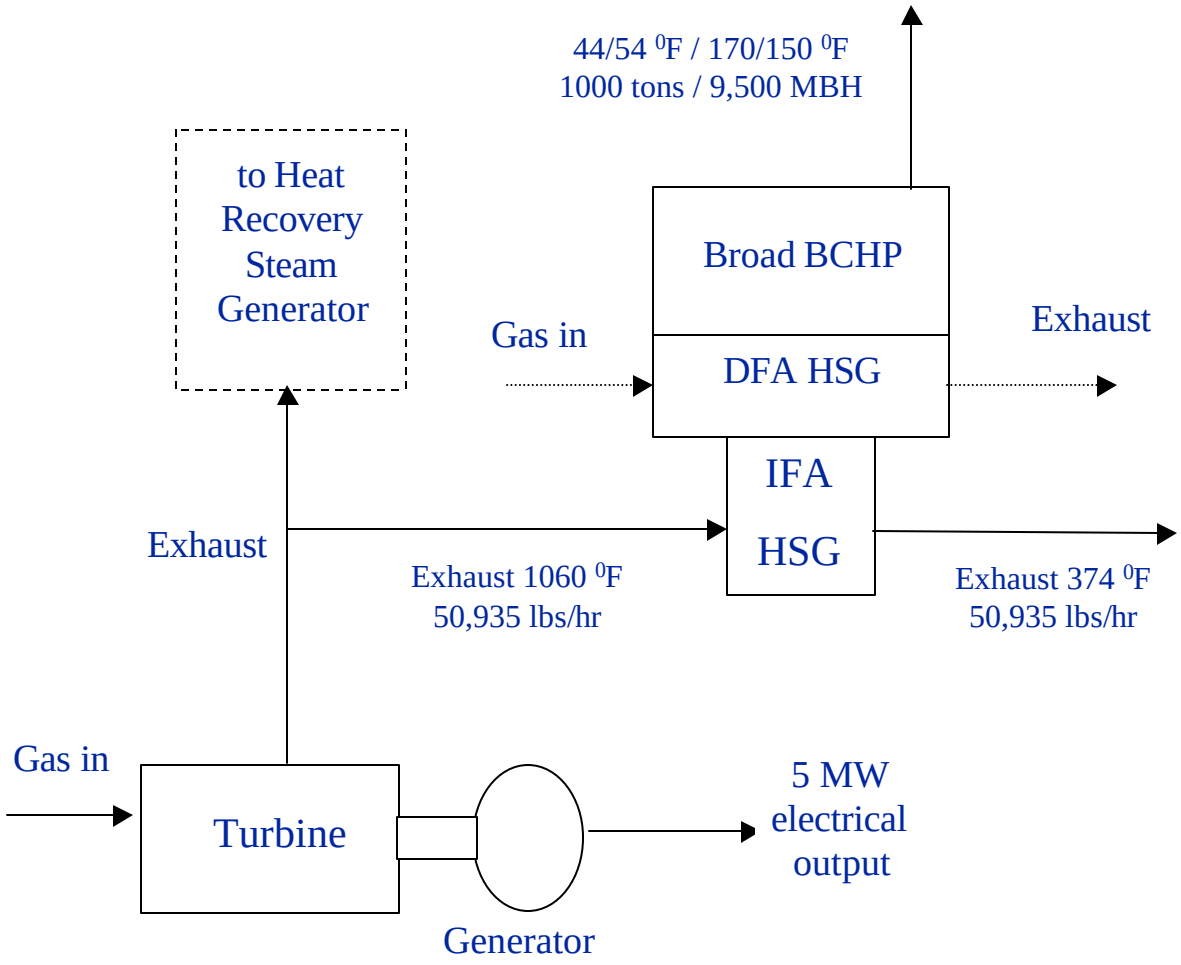
The Target Market

- Few commercial operations have enough heating load, year round, to justify cogeneration.
- Absorption chillers can provide the useful thermal load to support cogeneration.
- Large energy-intensive buildings such as labs, office buildings, hospitals and central plants for military facilities and college campuses require a substantial amount of cooling.

Cycle Design Considerations

- Heating and cooling loads typically coincide with high electricity demand.
- BCHP can substantially reduce life cycle cost for heating & cooling.
- BCHP enhances Risk Management.
- BCHP can provide Fuel Flexibility.

The Cycle Design



BROAD: BCHP-BSHR

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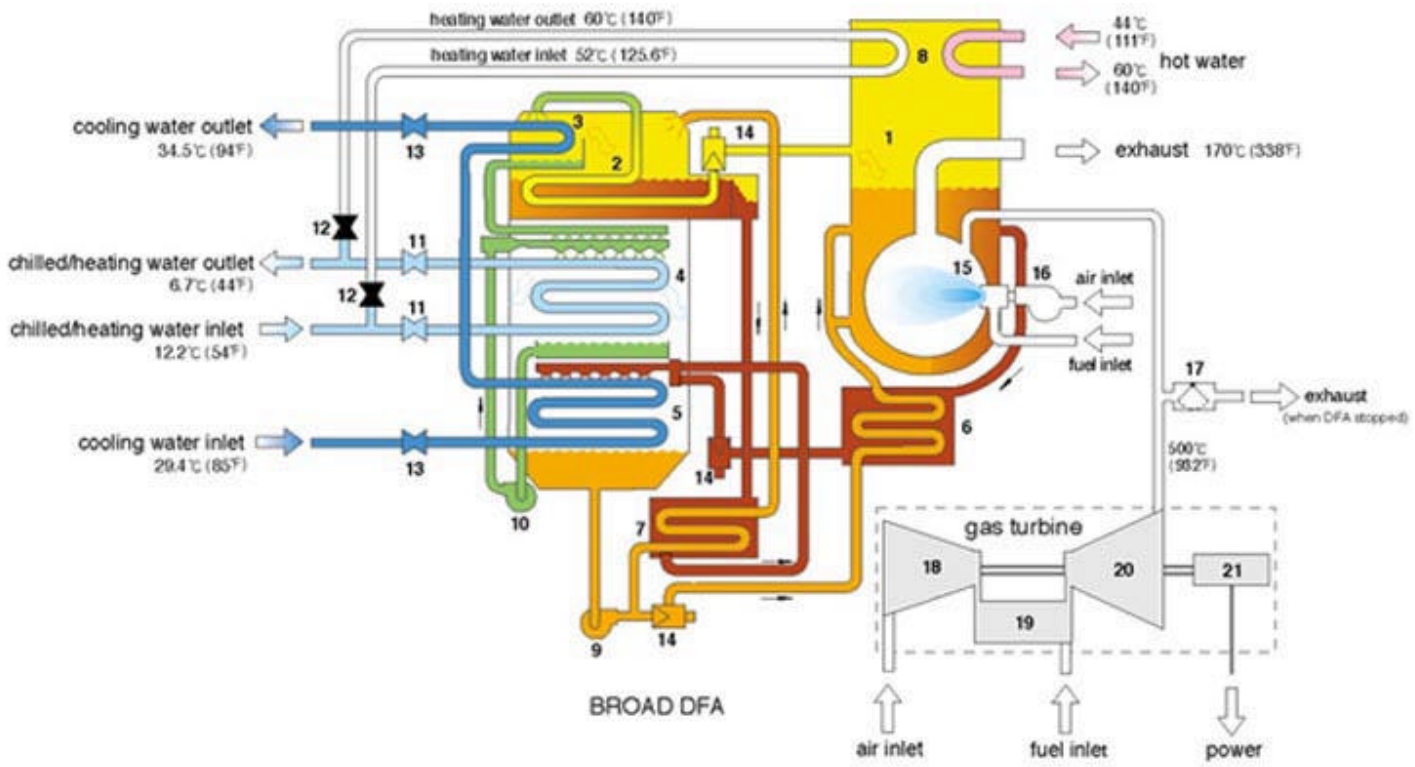
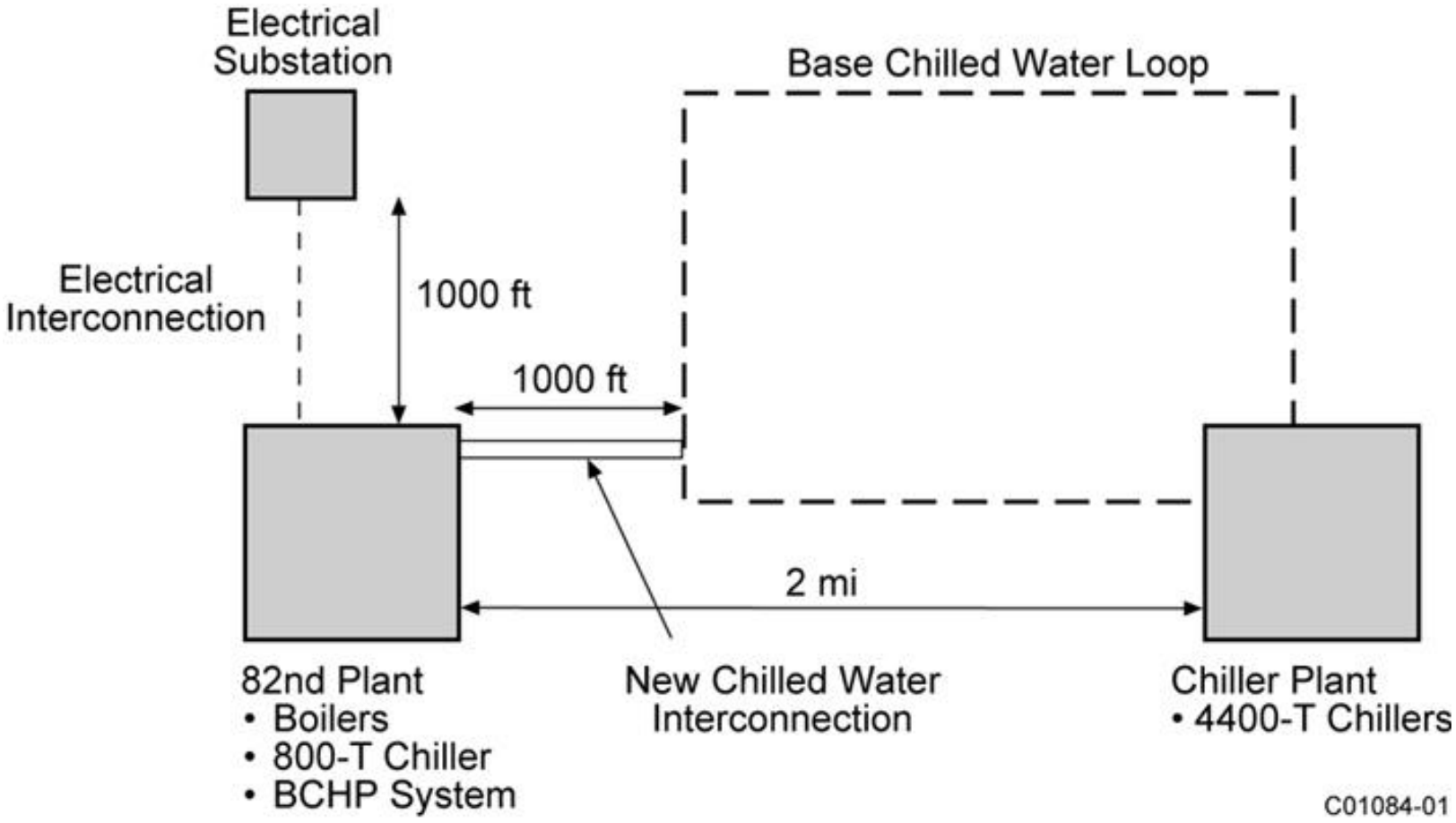


1.high stage generator
2.low stage generator
3.condenser
4.evaporator
5.absorber
6.high temperature heat exchanger
7.low temperature heat exchanger
8.water heater
9.solution pump
10.refrigerant pump
11.chilled water valve(open)
12.heating water valve(closed)
13.cooling water valve(open)
14.cooling/heating switch valve(open)
15.burner
16.blower
17.damper
18.compressor
19.combustor
20.turbine
21.generator

- chilled water
- cooling water
- hot water
- refrigerant water
- refrigerant vapor
- diluted solution
- concentrated solution

82nd Heating & Cooling Operations



The Energy Information System

The EIS functions include:

- •Gathering energy meter data,
- •Linking disparate building management systems and central plant control systems
- •Providing both controls and business applications to optimize operations on a real-time basis.
- •Providing management reports

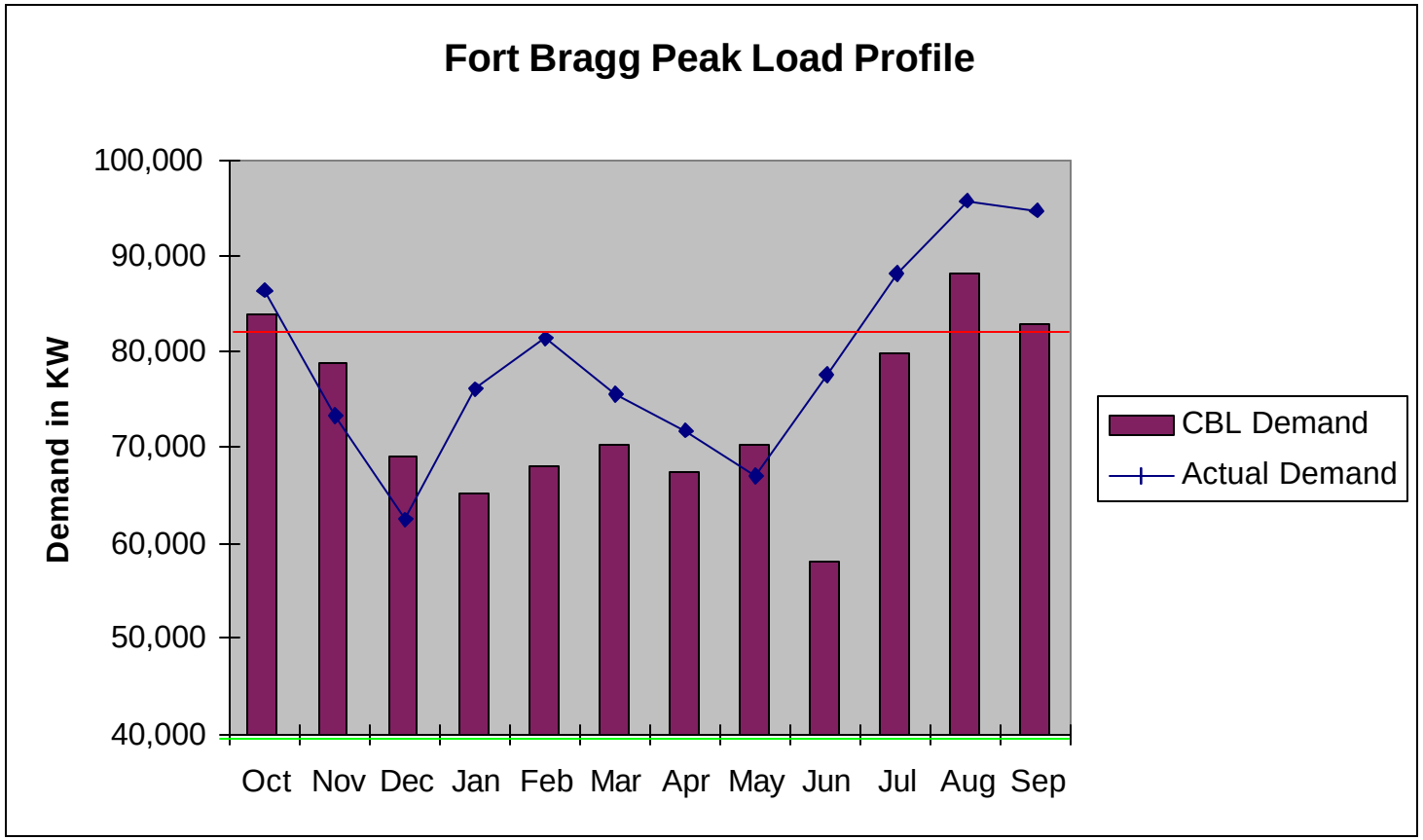
Architecture

- •Web based, open protocol
- •Systems are linked via the Fort Bragg WAN
- •All controls are capable of operating independently
- •Some applications are ASP

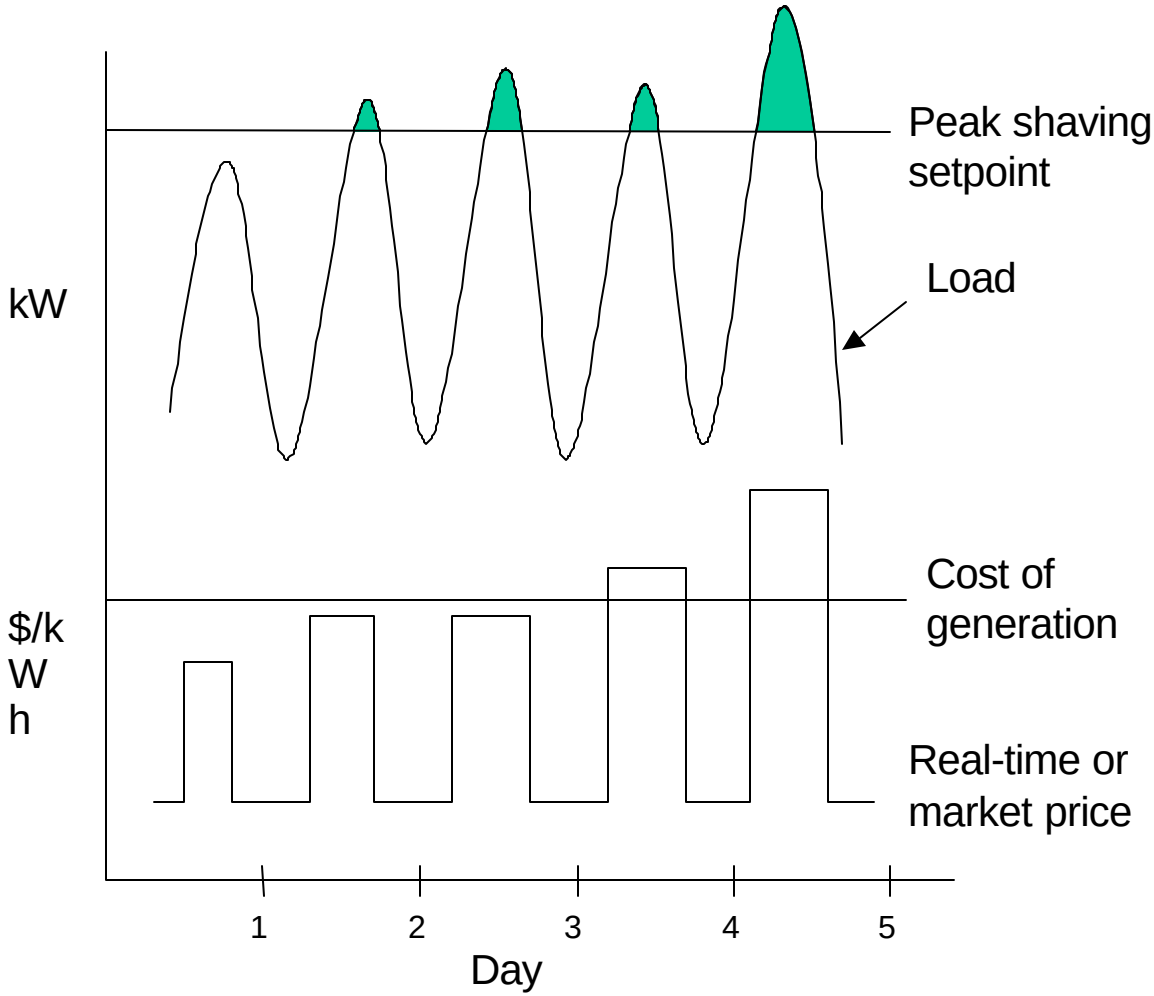
Functions related to BCHP

- •***Energy metering***
- •***Energy procurement applications***
- •***BCHP optimization***

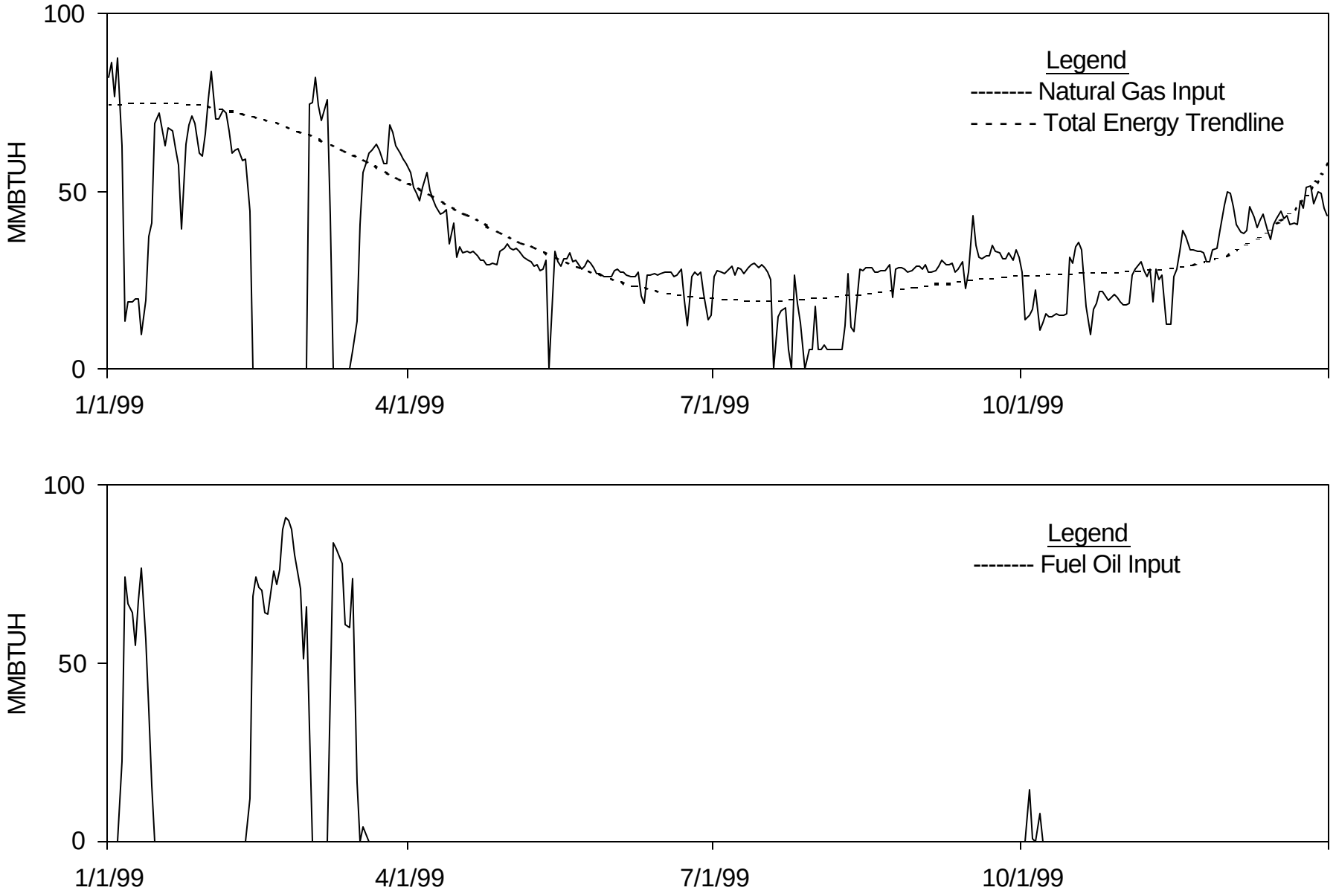
Electrical Load Management



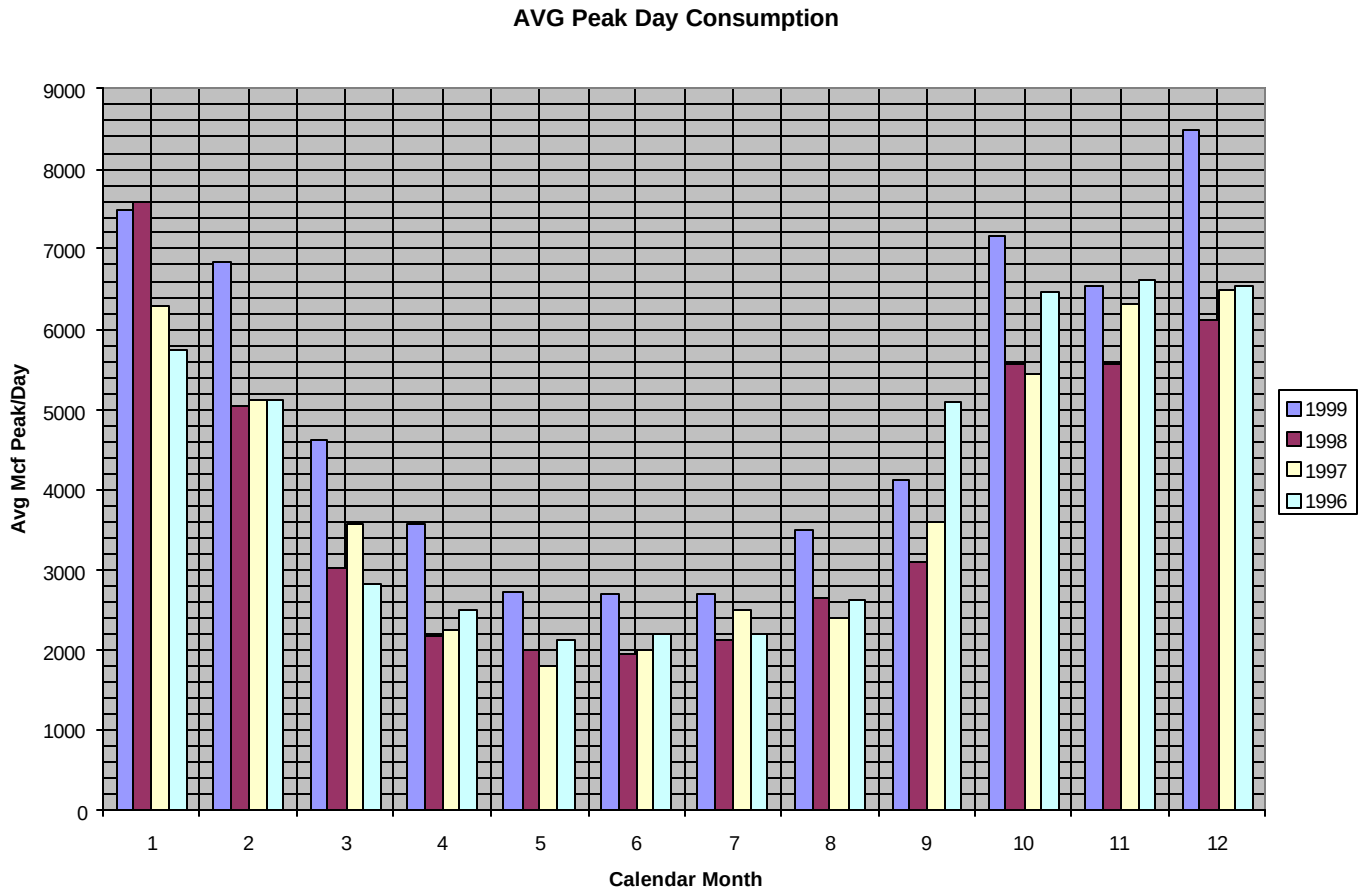
Electricity Control Parameters



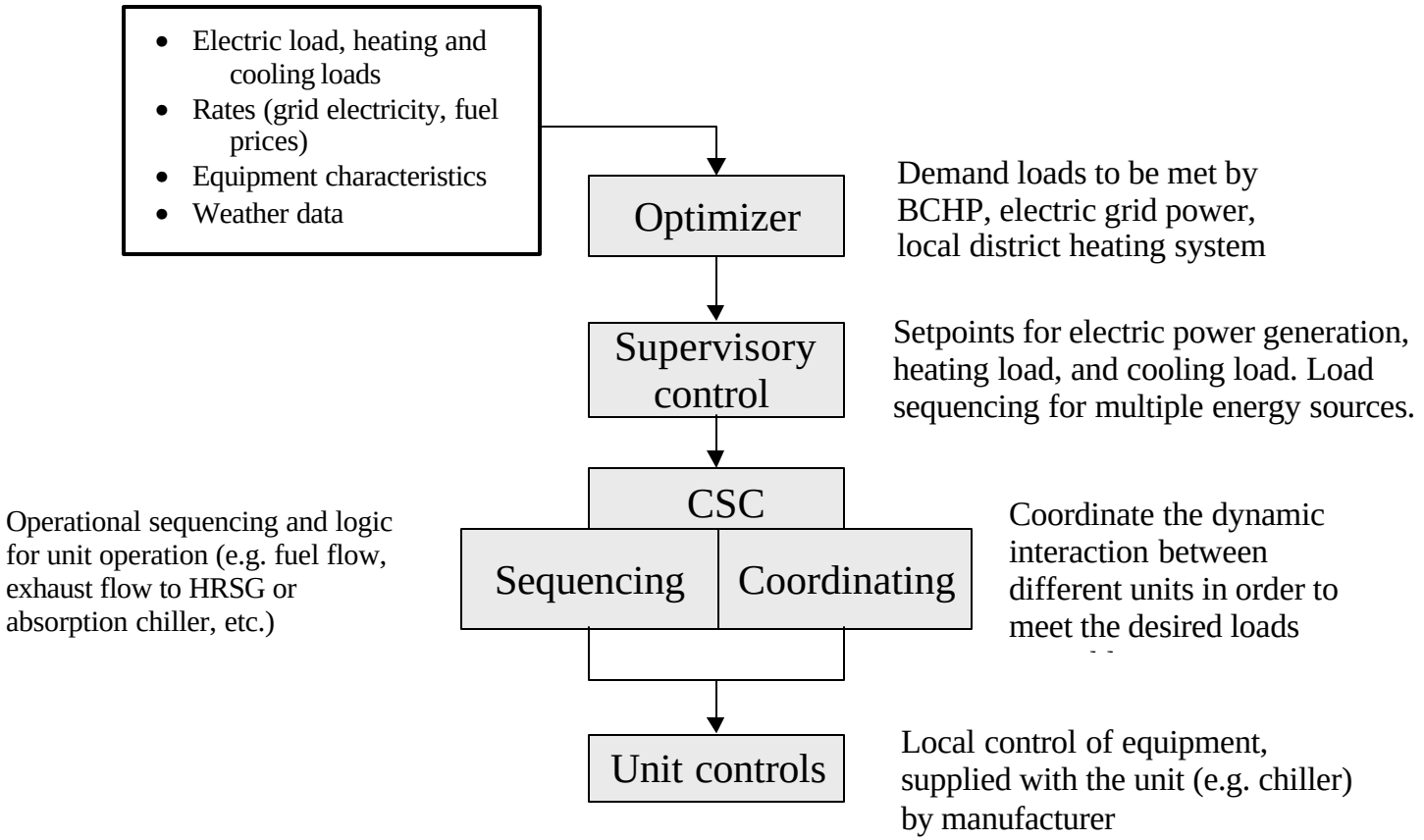
Ft. Bragg 82nd Div. Boiler Plant - Energy Input Rate: 1999



Gas Load Management



Controls Concept



Key Elements for Going Forward

- Life Cycle Cost Estimates
- Capital Cost Target
- Gas/Electricity Contracts
- Labor Issues
- Permits and Schedule
- Utility Interfaces